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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,128	11/25/2003	Bruce D. Dike	08814-00006	6196
21918	7590	09/01/2005	EXAMINER	
DOWNS RACHLIN MARTIN PLLC			JUBA JR, JOHN	
199 MAIN STREET			ART UNIT	
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BURLINGTON, VT 05402-0190			2872	

DATE MAILED: 09/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/721,128

Applicant(s)

DIKE, BRUCE D.

Examiner

John Juba, Jr.

Art Unit

2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 12-28 is/are pending in the application.
- 4a) Of the above claim(s) 3-5, 10, 16-25, 27 and 28 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1, 2, and 7 is/are allowed.
- 6) ☒ Claim(s) 6, 8, 9, 12-15, and 26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's affirmation of the election of group I, species b in the reply filed on June 17, 2005 is acknowledged. Because applicant did not distinctly and specifically point out any supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Specification

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: There is no clear antecedent basis in the specification for the expression "real space", as recited in claim 26.

Claim Objections

Claim 26, 6, 8, 9, and 12 – 15 are objected to because of the following informalities: There expression "real space" as recited in claim 26, does not find any clear meaning in the present disclosure. Are the claims referring to "free space?" Claims 6, 8, 9, and 12 – 15 are objected to for incorporating the same informality through their dependency from claim 26. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6, 8, 9, 12 - 15 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka, et al (U.S. Patent number 5,853,240) in view of Hoppe (5,715,023) alone, or at least further in view of PHILIPS ELECTRONICS (EP 0 606 940 A2). Referring to the discussion of Figure 9, Tanaka disclose a system for projecting a real image in real space, the system comprising

at least one image source (3c) operatively configured to provide a source image;

and

an optical system (40c) located a distance from said at least one image source,

the optical system comprising:

at least one converging element (41c); and

a cholesteric reflector-polarizer (13c);

said converging element being operatively configured, and the distance being

selected so that, when said at least one image source provides said source image, said optical system forms a real floating image of said source image in real space, *such that a projection screen can be located at the location of the floating image to reflect the real image to an observer.*

Thus, Tanaka, et al disclose the invention substantially as claimed. However, Tanaka, et al do not disclose the reflector-polarizer as a “broadband” reflector-polarizer, as recited.

In the same field of endeavor¹, Hoppe discloses an optical system comprising a converging element and cholesteric reflector-polarizer. Hoppe teaches that the display can be modified to provide a multicolored or broadband image by stacking cholesteric layers in the reflector-polarizer.

It would have been obvious to one of ordinary skill to stack a plurality of cholesteric layers in the reflector-polarizer (13c) of Tanaka, et al, in the interest of providing a multicolored or broadband image, as suggested by Hoppe. One of ordinary skill would have appreciated that the provision of a full-colored display would have offered greater marketability through greater consumer acceptance. The examiner believes that the stacked cholesteric layers, providing the “wider bandwidth” operation suggested by Hoppe (Col. 6, lines 3 – 5) fairly qualifies as a “broadband” reflector-polarizer. However, if such is not the case then the following applies.

In the same field of endeavor, PHILIPS ELECTRONICS teach that prior art broadband “polarizers” obtained by serially stacking a plurality of cholesteric layers having different band-pass characteristics suffer from several drawbacks including disclinations, loss of planar molecular order, and angular dependence stemming from requisite large thicknesses. In order to overcome these limitations, PHILIPS ELECTRONICS teach that a single cholesteric layer can be provided with a variable pitch so as to provide a broadband polarizing characteristic.

In practicing the invention of Tanaka, et al, it would have been obvious to one of ordinary skill to employ a variable-pitch, broadband cholesteric layer in place of the multi-layered reflector-polarizer of suggested by Hoppe, in the interest of providing a reflector-polarizer that overcomes the drawbacks associated with serially-stacked cholesteric layers, as taught by PHILIPS ELECTRONICS.

With regard to claims 6 and 8, the converging element comprises a beam splitter (half mirror coat) on the convex surface thereof so that the beam splitter is located between the source and real image.

With particular regard to claim 9, Tanaka, et al suggest integrating the polarizer-reflector (13c) on the plano surface of the converging element (41c) (Col. 10, lines 52 – 59). In such an embodiment, the converging element would “comprise” the broadband reflector-polarizer.

With particular regard to claim 12, the at least one converging element may be considered as being the concave reflector defined by the half mirror coating on the surface of lens 41c.

With regard to claims 14 and 15, PHILIPS ELECTRONICS teach that cholesteric polarizers can be operated in a recirculating configuration wherein theoretically, nearly 100% of the incident light ultimately becomes polarized (Pg. 2, lines 14 – 26). One of ordinary skill would have recognized this as corresponding to a transmissive/reflective efficiency of nearly 100%. It is clear however, that the actual efficiency would depend upon the operating bandwidth of the cholesteric polarizer with respect to the light source. Thus, it is believed that the broadband polarizer suggested by Hoppe would

have had at least the recited 60% efficiency. However, PHILIPS ELECTRONICS further teach that the prior art stacked cholesteric layers having different band-pass characteristics suffer from several drawbacks including disclinations, loss of planar molecular order, and angular dependence stemming from requisite large thicknesses. In order to overcome these limitations, PHILIPS ELECTRONICS teach that a single cholesteric layer can be provided with a variable pitch so as to provide a broadband polarizing characteristic. The examples of PHILIPS ELECTRONICS are operative over substantially the entire visible wavelength region. Thus, it is believed that one of ordinary skill would have arrived at a 90% efficiency, at least in view of the teachings of PHILIPS ELECTRONICS.

Note 1. Tanaka, et al teach that their optical system (40c) is equally useful in a *virtual* image display arrangement, as discussed in connection with Figure 17, atop Column 13. Thus, the two disclosures are in the same field of endeavor.

Allowable Subject Matter

Claim 1 is allowable over the prior art for the reasons previously indicated with respect to claim 11. Claims 2 and 7 now depend from an allowable claim, are fully examined on the merits, and are found to be allowable for the reasons indicated with respect to independent claim 1.

Response to Amendment

Applicant's amendment of claims 1, 14, 15, and 26 is sufficient in overcoming the previous rejection thereof under 35 U.S.C. §102(b) as being anticipated by PHILIPS G.G. (EP 0 467 447). As previously indicated, the prior art does not disclose the at least one converging element as comprising the broadband reflector-polarizer in a cylindrical configuration, as now recited in claim 1. In Figure 11, PHILIPS G.G. disclose an image of intermediate image (60) as being formed at location 70, and that location 70 is the location of the display panel (Col. 10, lines 53-54). Thus, PHILIPS G.G. do not disclose a system wherein the converging element is configured and cooperates to form a real floating image of the source image in real space, as now recited in claim 26.

For the reasons previously indicated with respect to claim 11, Applicant's amendment of claim 1 is sufficient in overcoming the rejection thereof under §102(b) as being anticipated by Hoppe, as well as the rejection of claim 1 under §103(a) as being unpatentable over Hoppe, in view of PHILIPS ELECTRONICS (EP 0 606 940).

Applicant's amendment of claims 6, 8, 12, and 13 to depend from claim 26 as now amended is sufficient in overcoming the previous rejection of claims 6, 8, 12, and 13 under §102(b) as being anticipated by Hoppe. Hoppe does not disclose an image source arranged and cooperating to form a real floating image of the source image in real space, as now recited in claim 26. PHILIPS ELECTRONICS fails to cure the aforementioned deficiency, and the rejection of claims 6, 8, 12, and 13 under §103(a)

as being unpatentable over Hoppe, in view of PHILIPS ELECTRONICS has been overcome by Applicant's amendment.

For the reasons previously indicated with respect to claim 11, Applicant's amendment of claim 1 is sufficient in overcoming the rejection thereof under §103(a) as being unpatentable over PHILIPS G.G., in view of M. Schadt (*SID* ' 90) together, or further in view of PHILIPS ELECTRONICS.

Applicant's amendment of claims 13 and 14 to depend from claim 26 as now amendment is sufficient in overcoming the rejection of claims 13 – 15 and 26 under §103(a) as being unpatentable over PHILIPS G.G., in view of M. Schadt, et al (*SID* ' 90) together, or further in view of PHILIPS ELECTRONICS. These references do not disclose an image source arranged and cooperating to form a real floating image of the source image in real space, as now recited in claim 26.

For the reasons previously indicated with respect to claim 11, Applicant's amendment of claim 1 is sufficient in overcoming the rejection thereof under §103(a) as being unpatentable over Tanaka, et al and Hoppe together, or further in view of PHILIPS ELECTRONICS.

Applicant's remarks concerning the rejection of claim 26 under §103(a) as being unpatentable over Tanaka, et al and Hoppe together, or further in view of PHILIPS ELECTRONICS have been fully considered but are not found persuasive. Accordingly, claim 26 stands as rejected above along with claims 6, 8, 9, and 12 – 15 now depending therefrom. While it is true that the system of Tanaka, et al having the corrective optic is *for* projecting a real image *on a screen*, the real image is floating in

time as a screen is erected at the location of the projected real image. That is, the optical system of Tanaka, et al is clearly separate from the screen, and inherently produces an image floating in real space until the projector is located in front of a wall, screen, or other projection surface.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

McGuire, et al (U.S. Patent Appl. Pub. No. 2005/0018309 A1) disclose an optical system for projecting an image to the user's eye, and suggest the use of broad band reflective polarizers such as photonic crystals (para. [0065]; Figs. 46, 47, 49, and 53).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Juba whose telephone number is (571) 272-2314. The examiner can normally be reached on Mon.-Fri. 9 - 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Drew Dunn whose number is (571) 272-2312 and who can be reached on Mon.- Thu., 9 - 5.

The **new centralized fax phone number** for the organization where this application or proceeding is assigned is (571) 273-8300 for *all* communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-2800.


JOHN JUBA, JR.
PRIMARY EXAMINER
Art Unit 2872

August 30, 2005